

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開平11-91238

(43) 公開日 平成11年(1999) 4月6日

(51) Int. CL<sup>6</sup>

識別記号

P I

B 4 1 M 5/00

B 4 1 M 5/00

B

B 0 5 D 5/04

B 0 5 D 5/04

B 3 2 B 27/00

B 3 2 B 27/00

F

審査請求 未請求 請求項の数 4 O L (全 10 頁)

(21) 出願番号

特願平9-257411

(22) 出願日

平成9年(1997) 9月24日

(71) 出願人 000005980

三菱製紙株式会社

東京都千代田区丸の内3丁目4番2号

(72) 発明者 植田 光弘

東京都千代田区丸の内3丁目4番2号三菱  
製紙株式会社内

(72) 発明者 李戸 哲也

東京都千代田区丸の内3丁目4番2号三菱  
製紙株式会社内

(72) 発明者 川崎 克彦

東京都千代田区丸の内3丁目4番2号三菱  
製紙株式会社内

(54) 【発明の名称】 インクジェット用複記録材の製造方法

(57) 【要約】

【課題】 写真の印画紙調の光沢を有するインクジェット用複記録材や、OHPフィルムとして使用可能な透明性が高いインクジェット用複記録材等の製造方法を提供する。更に詳しくはアルミナ水和物を含有するインク吸収層を支持体上に設けたインクジェット用複記録材の製造方法において、乾燥時のインク吸収層のひび割れを抑制したインクジェット用複記録材の製造方法を提供する。

【解決手段】 アルミナ水和物を含有する塗液を支持体上に塗工し、支持体上に塗工された塗液の濃度が2.5重量

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## 【特許請求の範囲】

【請求項1】 アルミナ水和物を含有するインク吸収層を支持体上に設けたインクジェット用被記録材の製造方法において、アルミナ水和物を含有する塗液を支持体上に塗工し、支持体上に塗工された塗液の濃度が25重量%を越えるまで、塗工面側には実質的に風をあてない状態で乾燥してインク吸収層を形成することを特徴とするインクジェット用被記録材の製造方法。

【請求項2】 支持体上に塗工された塗液の濃度が25重量%を越えるまでは、熱光源を用いて乾燥することを特徴とする請求項1記載のインクジェット用被記録材の製造方法。

【請求項3】 支持体上に塗工された塗液の濃度が25重量%を越えるまでは、支持体の塗液を塗工した面と反対側の面に熱風をあてて乾燥することを特徴とする請求項1記載のインクジェット用被記録材の製造方法。

【請求項4】 支持体上に塗工された塗液の濃度が25重量%を越えるまでは、支持体の塗液を塗工した面と反対側の面に熱媒体をあてて乾燥することを特徴とする請求項1記載のインクジェット用被記録材の製造方法。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、インクジェット記録方式を利用したプリンターやプロッターに使用されるインクジェット用被記録材の製造方法に関するものであり、特にカラー記録での要望が高い写真の印画紙調の光沢を有するインクジェット用被記録材や、OHPフィルムとして使用可能な透明性が高いインクジェット用被記録材等の製造方法に関するものである。

【0002】

【従来の技術】 近年、インクジェットプリンターやプロッターの目ざましい進歩により、フルカラーでしかも高精細な画像が容易に得られるようになってきた。これに伴い、従来からあるインクジェット記録用の上質紙や塗工紙以外でもインクジェット用被記録材の開発が切望されている。

【0003】 インクジェット記録方式は、種々の作動原理によりインクの微小液滴を飛翔させて紙等の被記録材に付着させ、画像および文字等の記録を行うものである。インクジェットプリンターやプロッターは、高速印

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ことが可能であり、更に作成部数が少ない用途においては、印刷技術や写真技術によるよりも安価で済むことから広く応用されつつある。

【0004】 最近では、銀塩写真の画像に匹敵する高精細な画像を出力できるインクジェットプリンター等が安価で市販されている。インクジェット用被記録材は、銀塩写真方式と比べ同品質の画像が得られながら非常に安価であることから、大面積の画像が必要な看板や商品見本等で表示画像を頻繁に取り替える利用者にとって経済的に大きなメリットがある。また、コンピューター上で画像を作成し、これをプリントアウトを見ながら配色やレイアウトを訂正することは従来の銀塩写真方式では全く無理であったが、インクジェット記録ではこのような操作が気軽にできるという長所もある。

【0005】 インクジェットプリンターやプロッターの利用分野として、最近、特に注目されているものとしては、写真に近い画質が要求される印刷分野におけるカラー版下の作製やデザイン部門でのデザインイメージのアウトプット等のフルカラー画像記録等や、コンピューターで作成した画像情報をインクジェットプリンターを用いて透明な被記録材に記録し、会議のプレゼンテーション等でOHP（オーバーヘッドプロジェクター）で利用する等がある。

【0006】 上述した、インクジェットプリンターやプロッターの利用分野からの要望や、インクジェットプリンターやプロッターの普及に伴い、被記録材に対する要望が多様化し、例えば、銀塩カラー写真並の高い光沢表面を有する優れた外観適性を備えた被記録材や、OHPフィルムとして使用可能な透明性の高い被記録材等が要望されている。

【0007】 インクジェット記録方式で使用される被記録材としては、通常の印刷、或は筆記用上質紙やコート紙を用いることができる様に、装置やインク組成の面から努力がなされてきた。しかし、高速化、高精細化、或はフルカラー化等インクジェット記録装置の性能の向上や用途の拡大に伴い、被記録材に対しても、より高度な特性が要求されるようになった。すなわち、被記録材としては、色調が明るく鮮やかであること、インクの吸収が速くて、印字ドットが重なった場合においてもインクが滲れ出したり滲みだりしないこと等が要求され

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を水系バインダーとともに紙表面に塗工して得られる被記録材が提案されている。シリカ等の無機顔料は吸着量が大きく、シリカ等の無機顔料をインク吸収層の主成分とする被記録材は一般にインクの吸収容量および吸収速度の点ではある程度のレベルに達するものであるが、被記録材自体の表面光沢が得られないという欠点を有する。光沢性を得る目的でシリカに替えてコロイダルシリカを使用すると先の特開昭56-157号公報に記載されているようにインクの吸収性を悪くするため好ましくない。また、光沢表面を備えたインクジェット用被記録材としては、塗層が湿潤状態にある間にキャスト仕上げて得られるキャスト塗紙が特開平6-320857号公報等に記載されているが、銀塩写真と比較するとその表面光沢は極めて低く、銀塩写真の質感が得られるものではない。

【0009】一方、透明性、光沢性を高めたインクジェット用被記録材としては、支持体上に樹脂からなるインク吸収層を設けたものが提案されている。こうした用途に使用される樹脂の例としては、例えば特開昭57-38185号、同62-184879号公報等に記載されるようなポリビニルピロリドン、ビニルピロリドン-酢酸ビニル共重合体、特開昭60-168651号、同60-171143号、同61-134290号公報に記載されるようなポリビニルアルコールを主体とする樹脂組成物、特開昭60-234879号公報に示されるようなビニルアルコールとオレフィンまたはスチレンと無水マレイン酸との共重合体、特開昭61-74879号公報に示されるようなポリエチレンオキサライドとイソシアネートとの架橋物、特開昭61-181679号公報に示されるようなカルボキシメチルセルロースとポリエチレンオキサライドとの混合物、特開昭61-132377号公報に示されるようなポリビニルアルコールにメタクリルアミドをグラフト化したポリマー、特開昭62-220383号公報に示されるようなカルボキシル基を有するアクリル系ポリマー、特開平4-214382号公報等に示されるポリビニルアセタール系ポリマー、特開平4-282282号、同4-285650号公報に記載されるような架橋性アクリル系ポリマー等種々のインク吸収性ポリマーが提案されている。また、特開平4-282282号、同4-285650号公報等には架

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報、特開平2-276670号、同3-215082号、同4-37576号、同4-67986号、5-16517号、同5-24335号、同5-32037号、同5-50739号、同5-286228号、同5-301441号、同6-48016号、同6-55829号、同6-183126号、同6-184954号、同6-199034号、同6-199035号、同6-218324、同6-255235号、同6-262844号、同6-270530号、同6-286297号、同6-297831号、同6-297832号、同6-316145号、同7-68919号、同7-68920号、同7-76161号、同7-76162号、同7-82694号、同7-89221号公報等に記載されているように微細なアルミナゾルを水溶性バインダーとともに支持体表面に塗工したインクジェット用被記録材が開示されている。しかしながら、アルミナ水和物からなるインク吸収層は、特開平5-24335号公報に記載されているように、塗工量が $20\text{ g/m}^2$ 程度以上でなければインク吸収容量が充分でないため、厚膜塗工が必要であるが、厚膜塗工をすると乾燥時にインク吸収層にひび割れが非常に発生しやすく、乾燥時のひび割れの発生を抑制する必要がある。

【0011】アルミナ水和物からなるインク吸収層の塗工乾燥時の塗膜のひび割れを抑制する方法としては、特開平7-76161号公報に記載されているような、ポリビニルアルコールをバインダーとして用い、ホウ酸またはホウ酸塩でバインダーのポリビニルアルコールをゲル化させ、塗膜の強度を向上させることによって、ひび割れを抑制する方法が提案されている。しかしながら、ポリビニルアルコールとホウ酸およびホウ酸塩のゲル化反応は非常に遅く、塗液の粘度の経時変化を避けることができず、塗工の安定性が悪くなる。また、ゲル化生成物がストリークの原因となる等、面質悪化の原因にもなる。特開平6-218324号公報には、アルミナ水和物からなる塗液を支持体上に塗工し、溶媒の除去の前にアンモニアガスを吹き付け、ゲル化させる方法が提案されている。しかしながら、アンモニアガスは腐食性が強いだけでなく、爆発性もあり危険である。また、余剰のアンモニアガスを回収する必要もあり、操作および設備の簡便さの点で望ましくない。上述の問題点を解決する

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に使用される被記録材の製造方法を提供することであり、特にカラー記録での要望が高い写真の印画紙調の光沢を有するインクジェット用被記録材や、OHPフィルムとして使用可能な透明性が高いインクジェット用被記録材等の製造方法を提供することである。

【0013】更に詳しくは、アルミナ水和物を含有するインク吸収層を支持体上に設けたインクジェット用被記録材の製造方法において、乾燥時のインク吸収層のひび割れを抑制したインクジェット用被記録材の製造方法を提供することである。

【0014】

【課題を解決するための手段】本発明の課題は以下に述べる手段によって解決することができた。すなわち、アルミナ水和物を含有するインク吸収層を支持体上に設けたインクジェット用被記録材の製造方法において、アルミナ水和物を含有する塗液を支持体上に塗工し、支持体上に塗工された塗液の濃度が25重量%を超えるまでは実質的に風をあてない状態で乾燥してインク吸収層を形成することにより解決することができた。

【0015】本発明において、実質的に風をあてない状態で乾燥するとは、風を支持体の塗液を塗工した面側に直接吹き付けることなく乾燥させることを言う。

【0016】一方、本発明において、風をあてた状態で乾燥するとは、動力を用いてノズルから風を発生させ、支持体の塗液を塗工した面側にノズルから風を直接吹き付けることによって乾燥させることを言う。

【0017】実質的に風をあてない状態で乾燥する方法としては、遠赤外線ヒーター等の熱光源による乾燥、支持体の塗液を塗工していない面側からの熱風をあてる方法、支持体の塗液を塗工していない面側にホットプレートや熱ロール等の熱媒体をあてる方式等が好ましいが、本発明はこれらに限定されるものではない。

【0018】

【発明の実施の形態】本発明は、アルミナ水和物を含有するインク吸収層を支持体上に設けたインクジェット用被記録材の製造方法を提供するものであり、インク吸収層はアルミナ水和物を含有する塗液を支持体上に塗工、乾燥することによって形成される。

【0019】しかしながら、アルミナ水和物の分散液は、安定な分散状態で液濃度を高めることが難しく、調

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塗工面が不均一な部分では、乾燥時の収縮が異なるために乾燥時に塗工面にひび割れが発生することがある。

【0021】一方、実質的に風をあてない状態で乾燥すると風紋の発生が抑えられ、その結果、乾燥時の収縮による塗工面のひび割れを抑制することができる。しかしながら、実質的に風をあてない状態で乾燥すると、風をあてた状態で乾燥した場合と比べて、乾燥速度が非常に遅くなる。

【0022】アルミナ水和物の分散液は、前述した様に、安定な分散状態で液濃度を高めることが難しく、通常は20重量%以下、好ましくは15重量%以下でないと、安定な分散液が得られない。しかしながら、25重量%を超えると著しい増粘もしくはゲル化を生じ、風をあてた状態で乾燥しても、ひび割れの原因となる風紋はほとんど発生することがない。

【0023】従って、支持体上に塗工された塗液の濃度が25重量%を超えるまでは実質的に風をあてない状態で乾燥し、支持体上に塗工された塗液の濃度が25重量%を超えれば直接風をあてる等、乾燥効率を重視した乾燥方法を用いてもよい。

【0024】なお、本発明において塗液の濃度は、特に断らない限り塗液中のアルミナ水和物の含有量を示すものとする。また、アルミナ水和物は種々の形態があるが、塗液濃度の算出にあたっては1水和物( $Al_2O_3 \cdot H_2O$ )に換算して算出するものとする。

【0025】本発明において、実質的に風をあてない状態で乾燥する方法としては、前述の如く、遠赤外線ヒーター等の熱光源による乾燥、支持体の塗液を塗工していない面側からの熱風をあてる方法、支持体の塗液を塗工していない面側にホットプレートや熱ロール等の熱媒体をあてる方式等が好ましいが、本発明はこれらに限定されるものではない。

【0026】なお、熱光源とは、発光に際し発熱を伴う光源を示し、タングステンランプ、ハロゲンランプ、キセノンランプ、メタルハライドランプ、赤外線ランプ等が挙げられるが、特にハロゲンランプ、赤外線ランプが好ましく用いられる。

【0027】本発明に用いられるアルミナ水和物としては、擬ペーナイト構造または非晶質構造から選ばれるアルミナ水和物が好ましく、擬ペーナイト構造のアルミナ

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ミナ水和物の名称を用いることにする。

【0029】また、アルミナ水和物は分散液の状態で安定剤（解膠剤）と共に存在していることが多く、粒子の大きさによってスラリー状のものとコロイド状のものに大別されるが、その境界は明確ではない。また、コロイド状のアルミナ水和物分散液はアルミナゾルまたはコロイダルアルミナと称されることが多く、その乾燥物（キセロゲル）のX線回折パターンは、無定形あるいはペーマイトゲル（擬ペーマイト）の回折パターンを示すことが多い。

【0030】なお、ペーマイトと擬ペーマイトの違いは水和数が異なることであり、擬ペーマイトの方が水和数が多い。更に詳しく言えば、ペーマイトの結晶は酸化アルミニウムの1水和物（ $\text{Al}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ）であるが、粒子径が小さいほど、表面に水和した水分子の量を無視できなくなる。それ故、ペーマイトのアルミナ水和物の微結晶が水に分散したコロイダルアルミナ等では、見かけの水和数が増えて $\text{Al}_2\text{O}_3 \cdot 1 \sim 1.5 \text{H}_2\text{O}$ の化学式で表されることがから、擬ペーマイトと呼ばれることがある。

【0031】なお、本発明において、ゲルとはゾル（コロイド状またはスラリー状の分散液）が水等の溶媒を含んだまま固化したものを言うが、水分が少ないものをキセロゲルと表して区別する。

【0032】アルミナ水和物の分散安定剤である解膠剤とは、帯電した粒子を中和するためのイオンであり、アルミナ水和物は酸性では正に帯電するため、陰イオン源である硝酸、塩酸、蟻酸、酢酸等の酸がアルミナ水和物の解膠剤として主に用いられるが、本発明はこれらに限定されるものではない。

【0033】なお、解膠とは、媒液中での粒子間の反発力が強く、粒子が媒液中で安定に分散する現象を言う。粒子が反発力をもつためには粒子が帯電していて、それを中和するための反対符号のイオンが吸着され、電気二重層をもっていなければならない。この電気二重層が静電的に反発して粒子の接近を防止する。もし、粒子に荷電がなく、表面に電気二重層が生じなければ解膠は起こらない。

【0034】アルミナ水和物が十分なインク吸収容量を有するには、アルミナ水和物の細孔体積は0.3～2.

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速度を有するには、アルミナ水和物の平均細孔半径が1～20nmであることが好ましく、特に3～10nmであることが好ましい。細孔半径が小さすぎるとインクを吸収し難くなる。また、細孔半径が大きすぎると、インク中の染料の定着が悪くなり画像の曇りが発生する。

【0036】アルミナ水和物がインク中の染料を十分に吸収し、定着するにはBET比表面積が70～300 $\text{m}^2/\text{g}$ の範囲であることが好ましい。BET比表面積が大きすぎると細孔径分布が大きい方に片よって、インク中の染料の定着の効率が悪くなり画像のにじみが発生する。逆にBET比表面積が小さすぎるとアルミナ水和物の分散が困難になる。

【0037】アルミナ水和物の分散液の濃度を上げるためには、アルミナ水和物の表面水酸基の数は10<sup>19</sup>個/g以上であることが好ましい。表面水酸基の数が少ないと、アルミナ水和物が凝集し易くなり、分散液の濃度を上げるのが困難になる。

【0038】本発明において、アルミナ水和物は通常水溶性バインダーと共に支持体上に塗工される。また、塗液の液性、塗液粘度、インク吸収層の成膜性および強度等を調整することを目的として、水溶性バインダーを複数組み合わせて用いることができる。このような水溶性バインダーとしては、完全ケン化または部分ケン化のポリビニルアルコールが、アルミナ水和物との混合性、塗液粘度の調整等の点で特に好ましいが、メチルセルロース、メチルヒドロキシエチルセルロース、メチルヒドロキシプロピルセルロース、ヒドロキシエチルセルロース等のセルロース系バインダー、でんぷんおよびその変性物、ゼラチンおよびそれらの変性物、カゼイン、プルラン、アラビアゴム、カラヤゴム、アルブミン、キトサン等の天然高分子樹脂またはこれらの誘導体、カチオン変性、シラノール変性等のポリビニルアルコールの変性物、SBRラテック、NBRラテックス、メチルメタクリレート-ブタジエン共重合体、エチレン-酢酸ビニル共重合体等のラテックス類、ポリアクリルアミド、ポリビニルピロリドン等のビニルポリマー、ポリエチレンイミン、ポリプロピレングリコール、ポリエチレングリコール、無水マレイン酸またはその共重合体等を挙げることができるが、本発明はこれらに限定されるものではない。

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0重量%が好ましく、特に10～15重量%が好ましい。

【0041】本発明において、インク吸収層の層構成は、単層であっても積層構成であってもよい。

【0042】積層構成の場合、全層がアルミナ水和物と水溶性バインダーを含む層であってもよいし、他の成分で構成される層とアルミナ水和物と水溶性バインダーを含む層との積層構成であってもよい。

【0043】全層ともアルミナ水和物と水溶性バインダーを含む層の場合、各層とも同じ層を積層しても良いし、異なった特性を有する層を積層してもよい。例えば、二層構成の場合、上層にはインク吸収速度を上げる目的で、細孔径の大きい層を設け、下層には透光性に有利な様に細孔径の小さい層を設け、インク吸収速度と透光性のバランスをとること等、目的に合わせた層構成にすることができる。

【0044】また、他の成分で構成される層とアルミナ水和物と水溶性バインダーを含む層との積層構成にする場合には、例えば、耐擦れ性、耐キズ性等の向上を目的とし、アルミナ水和物と水溶性バインダーを含む層の上層にコロイダルシリカ等のインク透過性の保護層を設けることができる。また、インク吸収容量を上げること等を目的として、アルミナ水和物と水溶性バインダーを含む層の下層に、ポリビニルアルコールやポリビニルピロリドン等水溶性樹脂からなるインク吸収層を設ける等、目的に合わせた層構成にすることができる。

【0045】アルミナ水和物の原料としては、特開昭57-88074号、同62-56321号、特開平4-275917号、同6-64918号、同7-10535号、同7-267633号公報、米国特許第2,656,321号明細書、Am. Ceramic Soc. Bull., 54, 289 (1975)等にアルミニウムアルコキシドを加水分解する方法が開示されている。この方法では、非常に純度の高いアルミナ水和物を得ることができる。

【0046】一方、アルミナ水和物の原料としては、特開昭54-116398号、同55-23034号、同55-27824号、同56-120508号公報に例示されている如きアルミニウムの無機塩またはその水和物が使用されることが一般的である。これらの無機塩と

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【0048】アルミナ水和物分散液からナトリウムイオン、カリウムイオン、硫酸イオン等の高濃度化を阻害するイオン（以下、単に阻害イオンと言う）を除去するのは困難であり、アルミナ水和物をゲル化させたゲル状アルミナ水和物を洗浄することが効果的である。しかしながら、水による洗浄ではこれらの阻害イオンを除去しきれなかったり、除去するのに大量の水を必要とすることが多く、アンモニア等の揮発性塩基性物質を含有する水溶液を用いてゲル状アルミナ水和物を洗浄することによって、より効果的に阻害イオンを除去することができる。

【0049】洗浄に用いる揮発性塩基性物質は、一部アルミナ水和物に吸着し、水洗しても完全には除去することはできない。しかしながら、ゲル状アルミナ水和物を乾燥させてキセロゲルとすることにより、効果的に揮発性塩基性物質を減少させることができる。なお、キセロゲルを得る方法としては、アルミナ水和物分散液を熱風乾燥、減圧乾燥、凍結乾燥、噴霧乾燥等によって乾燥させる方法がある。なお、キセロゲルを水に再分散させることにより、アルミナ水和物の分散液を得ることができる。

【0050】アルミナ水和物の製造方法としては、特に限定されるものではない。例えば、硫酸アルミニウム、硝酸アルミニウム、塩化アルミニウム等の酸性のアルミニウム塩水溶液と、アルミン酸ナトリウム、水酸化ナトリウム、アンモニア水等の塩基性水溶液との中和反応によってアルミナ水和物を製造することができる。この場合、液中に生成するアルミナ水和物の量が5重量%を超えない範囲で混合し、pHは6～10、温度20～100℃の条件下で反応させることが一般的である。また、特開昭56-120508号公報に記載されている如きpHを酸および塩基側に交互に変動させ、アルミナ水和物の結晶を成長させる方法、特公平4-33728号公報に記載されている如き、アルミニウムの無機塩から得られるアルミナ水和物と、バイヤー法で得られるアルミナとを混合し、アルミナを再水和する方法等によっても製造することができる。

【0051】本発明においてインクジェット用複記録材を製造する場合に、用いられる支持体としては、例えばポリエステルフィルム、樹脂被覆紙、コート紙等が主



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を得るためには、ポリエステルフィルムまたは樹脂被覆紙を用いることが好ましく、また、支持体のJIS-P-8123で測定したハンター白色度が65%以上であることが特に好ましい。

【0054】また、写真の印画紙調の光沢感、風合いを有するためには、インクジェット用被記録材のインク吸収層側のJIS-P-8123で測定したハンター白色度が65%以上であることが好ましく、JIS-Z-8741で測定した60度鏡面光沢が30%以上であることが好ましい。

【0055】本発明に用いる支持体として、ポリエステルフィルムを用いる際には、その厚さに特に制限する必要はないが、ハンドリング性とプリンターの通紙適性から10～200 $\mu$ m程度のものが好ましい。

【0056】本発明において、ポリエステルフィルムとは、テレフタル酸、イソフタル酸、ナフタレンジカルボン酸等の芳香族ジカルボン酸またはそのエステルと、エチレングリコール、ジエチレングリコール、1,4-ブタンジオール、ネオペンチルグリコール等の多価アルコールとを重合させて得られるポリエステルをフィルム化したものであり、通常はロール延伸、テンター延伸、インフレーション延伸等の処理により、配向処理されることが多い。

【0057】ポリエステルの具体例としてはポリエチレンテレフタレート、ポリエチレンブチレンテレフタレート、ポリエチレン-2,6-ナフタレートおよびこれらに他成分を共重合したもの等が挙げられるが、本発明はこれらに限定されるものではない。

【0058】ポリエステルフィルムの白色度を高める方法としては、硫酸バリウム、二酸化チタン、炭酸カルシウム、二酸化珪素、酸化アルミニウム、カオリン、タルク等の無機微粒子をポリエステルフィルム内部に含有させる方法や、白色塗料を表面に塗工する方法等がある。

【0059】また、クッション性や隠蔽性を付与するために、フィルム内部に多数の空洞を含有する空洞含有フィルム、例えば発泡ポリエステルフィルム等も用いることができる。

【0060】本発明に用いる支持体として、樹脂被覆紙を用いる際にも、厚さについては特に制限する必要はないが、ハンドリング性とプリンターの通紙適性から、5

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剤、蛍光増白剤、染料等の添加剤が配合される。更に、表面サイズ剤、表面紙力剤、蛍光増白剤、帯電防止剤、染料、アンカー剤等が表面塗工されていてもよい。

【0062】また、樹脂被覆紙用の原紙は、抄造中または抄造後、カレンダー等にて圧力を印加して圧縮する等した表面平滑性の良いものが好ましく、JIS-P-8119で測定したベックの平滑度が200秒以上のものが特に好ましい。また、その坪量は30～250g/m<sup>2</sup>が好ましい。

10 【0063】樹脂被覆紙用の原紙の白色度は、JIS-P-8123で測定したハンター白色度が65%以上であると白色度が高く、高級感のある被記録材が得られるが、目的により求める白色度は異なり、天然パルプとして未晒しパルプを用いた茶褐色の原紙を併用して用いてもよい。また、染料等の着色剤を用いて着色した原紙を用いてもよい。

【0064】樹脂被覆紙用の被覆樹脂としては、ポリオレフィン樹脂が好ましく、特にポリエチレン樹脂が好ましい。また、低密度ポリエチレン、中密度ポリエチレン、高密度ポリエチレンまたはこれらの混合物が使用できる。ここで言う低密度ポリエチレンとは、密度が0.915～0.930g/cm<sup>3</sup>のものであり、通常高圧法で製造されるものである。一方、高密度ポリエチレンとは、密度が0.950g/cm<sup>3</sup>以上のものであり、通常低圧法或は中圧法で製造されるものである。これらのポリエチレン樹脂は、各種の密度及びメルトフローレートを有するものを単独にまたはそれらの二種以上を混合して用いることができる。

30 【0065】樹脂被覆紙の樹脂層の構成は、単層、二層以上の多層のいずれであっても良い。この場合にも、上記のポリオレフィン樹脂を単独にまたは二種以上を混合して用いることができる。また、多層の各層を互いに異なる組成とすることも同一の組成とすることもできる。多層からなる樹脂層を形成する方法としては、共押出コーティング法と逐次コーティング法のいずれを採用しても良い。

40 【0066】一方、樹脂被覆紙の樹脂層は膜形成能のあるラテックスをコーティングすることによって形成することができる。例えば、最低成膜温度(MFT)の低いラテックスを樹脂被覆紙用の原紙にコーティングした

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脂肪酸金属塩、酸化防止剤、コバルトブルー、群青、セシリアンブルー、フタロシアニンブルー等のブルーの顔料や染料、コバルトバイオレット、ファストバイオレット、マンガン紫等のマゼンタの顔料や染料、蛍光増白剤、紫外線吸収剤等の各種の添加剤を適宜組み合わせて加えることができる。

【0069】本発明において支持体として用いられる樹脂被覆紙は、走行する原紙上に、加熱溶融したポリオレフィン樹脂を流延する、いわゆる押出コーティング法により製造される。また、樹脂と原紙との接着性を向上させるために、樹脂を原紙に被覆する前に、原紙にコロナ放電処理、火炎処理等の活性化処理を施すことが好ましい。支持体のインク吸収層が塗工される面（表面）は、その用途に応じて、光沢面、マット面等を有し、特に光沢面が好ましく用いられる。必ずしも裏面に樹脂を被覆する必要はないが、カール防止の点から樹脂被覆したほうが好ましい。裏面は通常無光沢面であり、表面或は必要に応じて表裏両面にも、コロナ放電処理、火炎処理等の活性化処理を施すことができる。

【0070】本発明は、OHPフィルムとして使用可能な、透明性の高いインクジェット用被記録材にも関するものであるが、OHPフィルム等の透光性を要求される被記録材においても、インク吸収層の組成だけでなく、支持体の特性も重要である。OHPフィルムとして使用する際の光透過率は、全光線透過率よりも、ヘーズ（曇り）の方が、人の感覚に近く、本発明のインク吸収層を、JIS-K-7105によるヘーズ（曇り）が3.0以下の透明支持体であることが特に好ましい。

【0071】また、OHPフィルムとして使用する際のインクジェット用被記録材のヘーズは、支持体上にインク吸収層を設けたインクジェット用被記録材において、インクジェット用被記録材のJIS-K-7105によるヘーズ（曇り）が10.0以下であることが特に好ましい。

【0072】なお、ヘーズ（曇り）は、積分球式光線透過率測定装置を用いて、並散透過率および全光線透過率を測定し、その比によって表すことが、JIS-K-7105に定められている。

【0073】OHPフィルム等の透光性を要求される被記録材において、用いる支持体の厚さは特に制限する必

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のタイプから選択してもよく、また、低分子のものでも高分子のものでもよい。1種もしくは2種以上界面活性剤を組み合わせ用いてもよい。界面活性剤の添加量は、固形分量でインク吸収層を構成するアルミナ水和物100重量部に対して0.001～5重量部が好ましく、より好ましくは0.01～3重量部である。

【0075】更に、インク吸収層には、上記の界面活性剤の他に、顔料、着色染料、着色顔料、インク染料の定着剤、紫外線吸収剤、酸化防止剤、顔料の分散剤、消泡剤、レベリング剤、防腐剤、蛍光増白剤、粘度安定剤、pH調節剤等の公知の各種添加剤を添加することもできる。

【0076】また、画像の解像性を向上させるために、アルミナ水和物の分散液と混合した際に、凝集等を生じることがなければ、インク吸収層にフッ素樹脂系、シリコン樹脂系またはアルキルケテンダイマー系の撥水剤またはサイズ剤を含有することにより、印字ドット径をコントロールして画像の解像性を向上させることができる。これらのフッ素樹脂系、シリコン樹脂系またはアルキルケテンダイマー系の撥水剤またはサイズ剤としては、一般に市販されているものを使用することができる。また、これらの溶液または水系エマルジョンのどちらでも使用可能である。インク吸収層へのこれらの撥水剤の添加量により印字ドット径をコントロールすることができる。その添加量は各成分や濃度および希望する印字ドット径によって異なるが、通常有効固形成分としてインク吸収層の全固形分に対して0.05～10重量%、特に好ましくは0.1～5重量%である。

【0077】本発明におけるインク吸収層塗液の塗工方法としては、例えば、スライドホッパー方式、カーテン方式、エクストルージョン方式、エアナイフ方式、ロールコーティング方式、ロッドバーコーティング方式等の通常用いられている塗工方法が用いられる。

【0078】本発明における支持体には、インク吸収層と支持体との接着性向上等の目的でアンカー層を設けてもよい。アンカー層にはゼラチン等の親水性バインダー、ブチラール等の溶剤可溶性バインダー、ラテックス、硬化剤、顔料、界面活性剤等を適宜組み合わせて添加せしめることができる。

【0079】本発明における支持体には、帯電防止性、



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【0081】（アルミナ水和物の分散液の製造例）下記にインク吸収層に用いるアルミナ水和物の製造例を示す。使用した原材料はすべて市販品であり、更に精製はせずそのまま使用した。

【0082】製造例1：イオン交換水800部、イソプロピルアルコール900部を3Lの反応器に仕込み、アルミニウムイソプロポキシド408部を加え、75℃に加熱した。イソプロピルアルコールを溜去しながら水400部を6時間かけて滴下した。イソプロピルアルコールの溜去が終了した後、95℃に昇温して24時間熟成した。その後、酢酸24部を加え、75℃にて12時間攪拌した後、全量が800部になるように濃縮し、白色のアルミナ水和物の分散液Aを得た。

【0083】このゾルを室温で乾燥させたキセロゲルのX線回折を測定したところ、擬ペーナイト構造を示した。また、透過電子顕微鏡で平均粒子径を測定したところ、10nmであり、アスペクト比は6であった。また、窒素吸着脱着方法によってBET比表面積、平均細孔半径、細孔体積を測定したところ、それぞれ141m<sup>2</sup>/g、8.7nm、0.76ml/gであった。

【0084】製造例2：市販のアルミナゾル（触媒化成製、カタロイドAS-3）をスプレードライヤー（入口温度200℃、出口温度80℃）で乾燥させてキセロゲルを得た。このキセロゲルのX線回折を測定したところ、擬ペーナイト構造を示した。また、透過電子顕微鏡で平均粒子径を測定したところ、10nmであった。また、窒素吸着脱着方法によってBET比表面積、平均細孔半径、細孔体積を測定したところ、それぞれ261m<sup>2</sup>/g、6.7nm、0.77ml/gであった。

【0085】このキセロゲル25部をイオン交換水75部に分散して白色のアルミナ水和物分散液Bを得た。

【0086】（塗工液の調製例）

調製例1：製造例1で得られたアルミナ水和物分散液A100部に、ポリビニルアルコール（信越化学製、MA-26）の10%水溶液15部を加え、アルミナ水和物含有量が13%の塗工液Aを調製した。

【0087】調製例2：製造例2で得られたアルミナ水和物分散液B100部に、ポリビニルアルコール（クラレ製、PVA-635）の10%水溶液25部を加え、アルミナ水和物含有量が20%の塗工液Bを調製した。

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調製例1で作製した塗工液Aを白色ポリエステルフィルム（アイ・シー・アイ製、メリネックス339、厚さ97μm）に塗工液の塗工量が200g/m<sup>2</sup>になるように塗工した。支持体上に塗工された塗液のアルミナ水和物含有量が25重量%を越えるまで、赤外線ヒーターを用いて塗工面側には実質的に風をあてない状態で乾燥した。次に、120℃の熱風を15m/sで塗工面上に吹き付け、インクジェット用被記録材を作製した。得られたインクジェット用被記録材のインク吸収層には、ひび割れは認められなかった。

【0091】また、JIS-Z-8741の方法に従い60度鏡面光沢を測定したところ、88%であった。なお、写真の印画紙調の風合いを有するためには、60度鏡面光沢は70%以上であることが好ましい。

【0092】実施例2

調製例2で作製した塗工液Bを透明ポリエステルフィルム（アイ・シー・アイ製、メリネックス705、厚さ100μm）に塗工液の塗工量が200g/m<sup>2</sup>になるように塗工した。支持体上に塗工された塗液のアルミナ水和物含有量が25重量%を越えるまで、支持体の背面から120℃の熱風をあて、塗工面側には実質的に風をあてない状態で乾燥した。次に120℃の熱風を15m/sで塗工面上に吹き付け、インクジェット用被記録材を作製した。得られたインクジェット用被記録材のインク吸収層には、ひび割れは認められなかった。

【0093】また、JIS-K-7105の方法に従いヘーズ（曇価）を測定したところ、6.2であった。OPPフィルムとして使用するには、ヘーズ（曇価）は10.0以下であることが特に好ましい。

【0094】実施例3

調製例2で作製した塗工液Bを透明ポリエステルフィルム（アイ・シー・アイ製、メリネックス705、厚さ100μm）に塗工液の塗工量が200g/m<sup>2</sup>になるように塗工した。支持体上に塗工された塗液のアルミナ水和物含有量が25重量%を越えるまで、支持体の背面に120℃熱ロールを押しつけて塗工面側には実質的に風をあてない状態で乾燥した。次に120℃の熱風を15m/sで塗工面上に吹き付け、インクジェット用被記録材を作製した。得られたインクジェット用被記録材のインク吸収層には、ひび割れは認められなかった。また、

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した。次に120℃の熱風を15m/sで塗工面上に吹き付け、インクジェット用被記録材を作製した。得られたインクジェット用被記録材のインク吸収層には、ひび割れは認められなかった。また、JIS-K-7105の方法に従いヘーズ（曇価）を測定したところ、6.0であった。

#### 【0096】実施例5

調製例3で作製した塗工液Cを白色ポリエステルフィルム（アイ・シー・アイ製、メリネックス339、厚さ97μm）に塗工液の塗工量が200g/m<sup>2</sup>になるように塗工した。支持体上に塗工された塗液のアルミナ水和物含有量が25重量%を越えるまで、赤外線ヒーターを用いて塗工面側には実質的に風をあてない状態で乾燥した。次に、120℃の熱風を15m/sで塗工面上に吹き付け、インクジェット用被記録材を作製した。得られたインクジェット用被記録材のインク吸収層には、ひび割れは認められなかった。また、JIS-Z-8741の方法に従い60度鏡面光沢を測定したところ、92%であった。

#### 【0097】比較例1

調製例2で作製した塗工液Bを透明ポリエステルフィルム（アイ・シー・アイ製、メリネックス705、厚さ100μm）に塗工液の塗工量が200g/m<sup>2</sup>になるように塗工した。次に120℃の熱風を15m/sで塗工面側に吹き付け、インクジェット用被記録材を作製した。得られたインクジェット用被記録材のインク吸収層

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には、ほぼ全面にひび割れが発生した。また、JIS-K-7105の方法に従いヘーズ（曇価）を測定したところ、26.4であった。

#### 【0098】比較例2

調製例2で作製した塗工液Bを白色ポリエステルフィルム（アイ・シー・アイ製、メリネックス339、厚さ97μm）に塗工液の塗工量が200g/m<sup>2</sup>になるように塗工した。次に120℃の熱風を15m/sで塗工面側に吹き付け、インクジェット用被記録材を作製した。得られたインクジェット用被記録材のインク吸収層には、ほぼ全面にひび割れが発生した。また、また、JIS-Z-8741の方法に従い60度鏡面光沢を測定したところ、58%であった。

【0099】（印字評価）実施例1～5で得られたインクジェット用被記録材をキャノン製フルカラーインクジェットプリンターBJC-610Jを使用して印字を行った。その結果、いずれのインクジェット用被記録材も、印字した部分にはムラ等がなく、良好な画質であった。

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【発明の効果】実施例から明らかな様に、アルミナ水和物を含有するインク吸収層を支持体上に設けたインクジェット用被記録材の製造方法において、乾燥時のインク吸収層のひび割れを抑制したインクジェット用被記録材の製造方法を提供することができた。

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-091238

(43)Date of publication of application : 06.04.1999

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(51)Int.Cl.

B41M 5/00

B05D 5/04

B32B 27/00

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(21)Application number : 09-257411

(71)Applicant : MITSUBISHI PAPER  
MILLS LTD

(22)Date of filing : 24.09.1997

(72)Inventor : IKEDA MITSUHIRO  
UTO TETSUYA  
KAWASAKI KATSUHIKO

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## (54) MANUFACTURE OF MATERIAL TO BE RECORDED FOR INK JET RECORDING

### (57)Abstract:

PROBLEM TO BE SOLVED: To provide manufacturing methods for a material to be recorded for ink jet recording having a glass which is similar to a photographic printing paper of photograph, or a material to be recorded for ink jet recording of a high transparency which can be used as an OHP film or the like, and in addition, in details, provide a manufacturing method for a material to be recorded for ink jet recording wherein a cracking of an ink absorbing layer at the time of drying is suppressed in a manufacturing method for a material to be recorded for ink jet recording wherein an ink absorbing layer containing an alumina hydrate is provided on a supporting body.

SOLUTION: A coating liquid containing an alumina hydrate is applied on a supporting body, and until the concentration of the coating liquid applied on the supporting body exceeds 25 wt.%, the supporting body is dried under a state wherein air is not substantially applied to the coated surface side, and an ink absorbing layer is formed. As drying methods, a method wherein a drying is performed using a thermal light source, a method wherein a drying is performed by applying hot air to the surface opposite from the coating liquid applied surface, and a method wherein a drying is performed by applying a heating medium to the surface opposite from the coating liquid applied surface or the like are especially preferable.

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## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

## CLAIMS

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[Claim(s)]

[Claim 1] The manufacture approach of the recorded material for ink jets characterized by to dry in the condition do not hit a wind to a coating side side substantially, and to form an ink absorption layer until the concentration of the coating liquid by which carried out coating of the coating liquid containing hydrated alumina on the base material in the manufacture approach of the recorded material for ink jets of having prepared the ink absorption layer containing hydrated alumina on the base material, and coating was carried out on the base material exceeds 25 % of the weight.

[Claim 2] The manufacture approach of the recorded material for ink jets according to claim 1 characterized by drying using the heat light source until the concentration of the coating liquid by which coating was carried out on the base material exceeds 25 % of the weight.

[Claim 3] The manufacture approach of the recorded material for ink jets according to claim 1 characterized by hitting hot blast to the field which carried out coating of the coating liquid of a base material, and the field of an opposite hand, and drying until the concentration of the coating liquid by which coating was carried out on the base material exceeds 25 % of the weight.

[Claim 4] The manufacture approach of the recorded material for ink jets according to claim 1 characterized by hitting a heat carrier against the field which carried out coating of the coating liquid of a base material, and the field of an opposite hand, and drying until the concentration of the coating liquid by which coating was carried out on the base material exceeds 25 % of the weight.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the manufacture approaches, such as a recorded material for ink jets with which especially the want by color record has the gloss

of the photographic paper tone of a high photograph, and a recorded material for ink jets with high transparency usable as an OHP film, about the manufacture approach of the recorded material for ink jets used for the printer using an ink jet recording method, or a plotter.

[0002]

[Description of the Prior Art] In recent years, an image full color and high definition moreover has come to be easily obtained by \*\*\*\* better \*\*\*\*\* of an ink jet printer or a plotter. In connection with this, it is anxious for development of the recorded material for ink jets from the former also except the paper of fine quality and coated paper for a certain ink jet record.

[0003] An ink jet recording method makes the minute drop of ink fly by various working principles, is made to adhere to recorded materials, such as paper, and records an image, an alphabetic character, etc. An ink jet printer and a plotter are excellent in high-speed printing nature or low noise nature, the versatility of a record pattern is large, development-fixation has the features, such as needlessness, and the complicated image is observed at accuracy and the point which can be formed promptly. As a hard copy listing device of image information, such as an alphabetic character created especially by computer, and various graphic forms, it has spread quickly in various applications in recent years. Moreover, it is also easy by using two or more ink nozzles to perform multicolor record. By the multicolor ink jet method, it is possible for the color picture formed to acquire equal record as compared with the print by process printing by the platemaking method or the color photography method, and it is widely applied from being cheap and ending rather than being based on a printing technique or a photograph technique in an application with still few creation number of copies.

[0004] Recently, the ink jet printer which can output the high definition image which is equal to the image of a film photo is cheap, and is marketed. Since the recorded material for ink jets is dramatically cheap while the image of this quality is obtained compared with a film photo method, it has a big merit economically for the user who exchanges a display image frequently with a signboard, a sample, etc. of a large area which need an image. Moreover, creating an image on a computer and looking at print-out for this, by the conventional film photo method, correcting a color scheme and a layout also has the advantage in which such actuation can be performed freely, by ink jet record, although it was completely impossible.

[0005] As a field of the invention of an ink jet printer or a plotter, full color image recording, such as production of the color block copy in the printing field as which the image quality near a photograph is required, and output of the design image in a design category, etc. and the image information created by computer are recorded on a transparent recorded material using an ink jet printer, and it is one of those attract attention especially to use by OHP (over head projector) by the presentation of a board etc. recently.

[0006] The recorded material equipped with the outstanding appearance fitness which the want to a recorded material is diversified, for example, has about the same high gloss front face as silver salt color photography, the recorded material with high transparency usable as an OHP film, etc. are demanded with the spread of the want from the field of the invention of an ink jet printer or a plotter mentioned above, an ink jet printer, or plotters.

[0007] As a recorded material used by the ink jet recording method, efforts have been made from equipment or the field of an ink presentation so that the usual paper of fine quality for printing or a note and coated paper can be used. However, a more advanced property came to be required also from the recorded material with improvement in engine performance of an ink jet recording device, such as improvement in the speed, highly-minute-izing, or full-color-izing, or amplification of an application. That is, when a color tone's being brightly skillful as a recorded material and absorption of ink are quick and a printing dot laps, ink flows out, it spreads, or not to carry out etc. is demanded. Especially in color record, the color overlapping record which piles up not only monochrome record of yellow Magenta cyanogen black but these colors is made, and since ink coating weight increases further, the very severe engine performance is required.

[0008] As a recorded material for ink jets, the recorded material obtained by carrying out coating of the silicon-containing pigments, such as a silica looked at by JP,55-51583,A, 56-157, 57-107879, 57-107880, 59-230787, 62-160277, 62-184879, 62-183382, the 64-11877 official report, etc., for example, to a paper front face with a drainage system binder is proposed conventionally. Although inorganic pigments, such as a silica, have large oil absorption and the recorded material which uses inorganic pigments, such as a silica, as the principal component of an ink absorption layer reaches the level of extent which is generally the absorption capacity of ink, and the point of rate of absorption, it has the fault that the surface gloss of the recorded material itself is not acquired. It is not desirable in order to worsen absorptivity of ink as indicated by previous JP,56-157,A if it changes to a silica in order to acquire glossiness, and colloidal silica is used. Moreover, although the cast coated paper obtained by carrying out cast finishing is indicated by JP,6-320857,A etc. as a recorded material for ink jets equipped with the gloss front face while a coated layer is in a damp or wet condition, as compared with a film photo, the surface gloss is very low, and the texture of a film photo is not obtained.

[0009] What, on the other hand, prepared the ink absorption layer which consists of resin on the base material as a recorded material for ink jets which raised transparency and glossiness is proposed. As an example of the resin used for such an application For example, a polyvinyl pyrrolidone which is indicated by JP,57-38185,A, the 62-184879 official report, etc., A vinyl-pyrrolidone-vinyl acetate copolymer, JP,60-168651,A, 60-171143, the resin constituent which makes a subject polyvinyl alcohol which is indicated by the 61-134290 official report, The copolymer of vinyl alcohol, an olefin or styrene as shown in JP,60-234879,A, and a maleic anhydride, The bridge formation object of polyethylene oxide and isocyanate as shown in JP,61-74879,A, The mixture of a carboxymethyl cellulose and polyethylene oxide as shown in JP,61-181679,A, The polymer which graft-ized methacrylamide to polyvinyl alcohol as shown in JP,61-132377,A, The acrylic polymer which has a carboxyl group as shown in JP,62-220383,A, Various ink absorptivity polymers, such as a cross-linking acrylic polymer which is indicated by the polyvinyl-acetal system polymer shown in JP,4-214382,A etc., JP,4-282282,A, and the 4-285650 official report, are proposed. Moreover, although the mixed recorded material of the polymer matrix and absorptivity polymer which consist of cross-linking polymers is proposed by JP,4-282282,A and the 4-285650 official report, the ink absorption layer which consists of resin has the fault that rate of absorption is slow, as compared with the ink absorption layer which consists of pigment particles, such as a silica.



[0010] As a recorded material for ink jets with which ink rate of absorption was quick with a recorded material and raised transparency and glossiness The recorded material for ink jets using hydrated alumina is proposed in recent years. For example, JP,60-232990,A, a 60-245588 official report, JP,3-24906,B, JP,2-276670,A, 3-215082, 4-37576, 4-67986, No. 16517 [ five to ], 5-24335, 5-32037, 5-50739, 5-286228, 5-301441, 6-48016, 6-55829, 6-183126, 6-184954, 6-199034, 6-199035 -- said -- 6-218324 and 6-255235 -- 6-262844, 6-270530, 6-286297, 6-297831, 6-297832, 6-316145, 7-68919, 7-68920, 7-76161, 7-76162, The recorded material for ink jets which carried out coating of the detailed alumina sol to the support surface with the water-soluble binder as indicated by 7-82694, the 7-89221 official report, etc. is indicated. However, if the amount of coating is not 2 or more-about 20 g/m, since ink absorption capacity is not enough, thick-film coating is required for the ink absorption layer which consists of hydrated alumina but, as indicated by JP,5-24335,A, if thick-film coating is carried out, at the time of desiccation, it is very easy to generate a crack in an ink absorption layer, and it needs to control generating of the crack at the time of desiccation in it.

[0011] The approach of controlling a crack is proposed by making the polyvinyl alcohol of a binder gel by the boric acid or the borate as an approach of controlling the crack of the paint film at the time of coating desiccation of the ink absorption layer which consists of hydrated alumina, using as a binder polyvinyl alcohol which is indicated by JP,7-76161,A, and raising the reinforcement of a paint film. However, the gelation reaction of polyvinyl alcohol, a boric acid, and a borate is dramatically quick, and aging of the viscosity of coating liquid cannot be avoided, but the stability of coating worsens. Moreover, that a gelation product causes a streak etc. causes surface condition aggravation. Coating of the coating liquid which becomes JP,6-218324,A from hydrated alumina is carried out on a base material, and blasting and the approach of making it gel are proposed in ammonia gas before clearance of a solvent. However, corrosive [ of ammonia gas ] is [ it is not only strong, but / explosivity ] and is dangerous. Moreover, it is necessary to collect excessive ammonia gas, and is not desirable in respect of the simplicity of actuation and a facility. As an approach of solving an above-mentioned trouble, the recorded material for ink jets which has the ink absorption layer which consists of hydrated alumina and gelatin is proposed by JP,7-89221,A. This approach uses the property which the gelatin solution which dissolved in warm water gels at low temperature. However, if drying temperature is made high, in order for gelatin to solate again, it is necessary to lower a coating rate and to make it dry by low temperature by this approach.

[0012]

[Problem(s) to be Solved by the Invention] The technical problem of this invention is offering the manufacture approach of the recorded material used for the printer using an ink jet recording method, or a plotter, and is offering the manufacture approaches, such as a recorded material for ink jets with which especially the want by color record has the gloss of the photographic paper tone of a high photograph, and a recorded material for ink jets with high transparency usable as an OHP film.

[0013] Furthermore, in the manufacture approach of the recorded material for ink jets of having prepared the ink absorption layer containing hydrated alumina on the base material in detail, it is offering the manufacture approach of the recorded material for ink jets which controlled the crack of the ink absorption layer at the time of desiccation.

[0014]

[Means for Solving the Problem] The technical problem of this invention was solvable with the means expressed below. That is, in the manufacture approach of the recorded material for ink jets of having prepared the ink absorption layer containing hydrated alumina on the base material, it was solvable by drying in the condition of not hitting a wind substantially and forming an ink absorption layer until the concentration of the coating liquid by which carried out coating of the coating liquid containing hydrated alumina on the base material, and coating was carried out on the base material exceeded 25 % of the weight.

[0015] In this invention, it says making it dry, without spraying a wind on the field side which carried out coating of the coating liquid of a base material to drying in the condition of not hitting a wind substantially directly.

[0016] A wind is generated from a nozzle using power as on the other hand, drying in this invention, where a wind is hit, and it says making it dry by spraying a wind on the field side which carried out coating of the coating liquid of a base material directly from a nozzle.

[0017] Although the approach of guessing the hot blast from the desiccation side by the heat light sources, such as a far-infrared heater, and the field side which has not carried out coating of the coating liquid of a base material, the method which hits heat carriers, such as a hot plate and a hot calender roll, to the field side which has not carried out coating of the coating liquid of a base material are desirable as an approach of drying in the condition of not hitting a wind substantially, this invention is not limited to these.

[0018]

[Embodiment of the Invention] This invention offers the manufacture approach of the recorded material for ink jets of having prepared the ink absorption layer containing hydrated alumina on the base material, and an ink absorption layer is formed coating and by drying on a base material in the coating liquid containing hydrated alumina.

[0019] However, it is difficult for the dispersion liquid of hydrated alumina to raise liquid concentration in the state of stable distribution, and 20 or less % of the weight, unless it is 15 or less % of the weight preferably, stable dispersion liquid are not usually obtained. As an amount of solid content smear, two or more 20 g/m, it is preferably required two or more 30 - 50 g/m, and it is required two or more 100 g/m, in order to obtain a good ink absorption capacity as paint volume to be able to carry out the coating of 150 - 300 g/m<sup>2</sup> on a base material preferably at least.

[0020] If the paint volume which carries out coating dries where a wind is hit when many [ above very ], a wind ripple etc. will occur in a coating side and it will become an uneven coating side. Moreover, in a wind ripple, i.e., a part with an uneven coating side, since the contraction at the time of desiccation differs, a crack may occur in a coating side at the time of desiccation.

[0021] If it dries in the condition of on the other hand not hitting a wind substantially, generating of a wind ripple will be suppressed, consequently the crack of the coating side by the contraction at the time of desiccation can be controlled. However, if it dries in the condition of not hitting a wind substantially, compared with the case where it dries where a wind is hit, a rate of drying will become very slow.

[0022] The thing which were mentioned above and for which liquid concentration is raised in the state of stable distribution like is difficult for the dispersion liquid of

hydrated alumina, and 20 or less % of the weight, unless it is 15 or less % of the weight preferably, stable dispersion liquid are not usually obtained. However, even if it will dry where it produced remarkable thickening or gelation and a wind is hit if 25 % of the weight is exceeded, the wind ripple leading to a crack is hardly generated.

[0023] Therefore, the desiccation approach which thought drying efficiency as important may be used, such as drying in the condition of not hitting a wind substantially until the concentration of the coating liquid by which coating was carried out on the base material exceeds 25 % of the weight, and hitting a direct wind, if the concentration of the coating liquid by which coating was carried out on the base material exceeds 25 % of the weight.

[0024] In addition, unless especially the concentration of coating liquid is refused in this invention, the content of the hydrated alumina in coating liquid shall be shown.

Moreover, hydrated alumina shall be computed in calculation of coating liquid concentration by converting into one hydrate (aluminum  $2O_3$ ,  $H_2O$ ), although there are various gestalten.

[0025] In this invention, although the approach of guessing the hot blast from the desiccation side by the heat light sources, such as a far-infrared heater, and the field side which has not carried out coating of the coating liquid of a base material, the method which hits heat carriers, such as a hot plate and a hot calender roll, to the field side which has not carried out coating of the coating liquid of a base material are desirable like the above-mentioned as an approach of drying in the condition of not hitting a wind substantially, this invention is not limited to these.

[0026] In addition, although the heat light source shows the light source accompanied by generation of heat on the occasion of luminescence and a tungsten lamp, a halogen lamp, a xenon lamp, a metal halide lamp, an infrared lamp, etc. are mentioned, especially a halogen lamp and an infrared lamp are used preferably.

[0027] As hydrated alumina used for this invention, the hydrated alumina chosen from pseudo-boehmite structure or amorphous structure is desirable, and the hydrated alumina of pseudo-boehmite structure has the desirable pore volume of an ink absorption layer especially from a large thing.

[0028] In addition, the generic name of the matter expressed as hydrated alumina with the chemical formula of  $Al_2O_3 \cdot xH_2O$  -- it is -- the difference in a presentation or a crystalline form -- a jib -- it is expressed as a site, the Bahia light, NORUSUTORANDAITO, boehmite, boehmite gel (pseudo-boehmite), diaspor, amorphous alumina gel, etc. In addition, although the expression with which hydrated alumina says it as hydrated alumina by infrared absorption since existence of a water molecule is not accepted is not exact, in this invention, the name of hydrated alumina will be used according to established practice.

[0029] Moreover, the boundary is not clear, although hydrated alumina exists with the stabilizer (deflocculant) in the state of dispersion liquid in many cases and it is divided roughly into a slurry-like thing and the thing of colloid by the magnitude of a particle. Moreover, the hydrated alumina dispersion liquid of colloid are called alumina sol or a colloidal alumina in many cases, and the X diffraction pattern of the dry matter (xerogel) shows the diffraction pattern of amorphous or boehmite gel (pseudo-boehmite) in many cases.

[0030] In addition, the difference between boehmite and pseudo-boehmite is that hydration numbers differ, and a hydration number has more pseudo-boehmite. It becomes

impossible furthermore, to disregard the amount of the water molecule hydrated on the front face, although the crystal of boehmite will be one hydrate ( $\text{aluminum}_2\text{O}_3$  and  $\text{H}_2\text{O}$ ) of an aluminum oxide if it says in detail, so that particle diameter is small. So, in the colloidal alumina which the microcrystal of the hydrated alumina of boehmite distributed in water, since an apparent hydration number increases and it is expressed with the chemical formula of  $\text{aluminum}_2\text{O}_3 \cdot 1.5\text{H}_2\text{O}$ , it may be called pseudo-boehmite.

[0031] In addition, in this invention, although gel means what was solidified while the sol (dispersion liquid of the shape of colloid or a slurry) had contained solvents, such as water, what has few moisture is expressed as xerogel, and is distinguished.

[0032] Although the deflocculant which is a distributed stabilizer of hydrated alumina is the ion for neutralizing the electrified particle and acids, such as a nitric acid it is [ nitric acid ] a source of an anion since hydrated alumina is just charged with acidity, a hydrochloric acid, formic acid, and an acetic acid, are mainly used as a deflocculant of hydrated alumina, this invention is not limited to these.

[0033] In addition, the repulsive force of amalgam decomposition between the particles in the inside of a medium is strong, and it means the phenomenon which a particle distributes to stability in a medium. In order for a particle to have repulsive force, the particle is charged, it adsorbs and the ion of the opposite sign for neutralizing it must have an electric double layer. This electric double layer opposes electrostatic and access of a particle is prevented. There is no electrification in a particle, and if an electric double layer does not arise on a front face, amalgam decomposition does not happen.

[0034] In order for hydrated alumina to have sufficient ink absorption capacity, as for the pore volume of hydrated alumina, it is desirable that it is the range of 0.3-2.0ml/g, and it is especially desirable that it is the range of 0.4 - 1.0 ml/g. When the pore volume of an ink absorption layer is large, there is an inclination for a crack and powder omission to occur in an ink absorption layer, and for absorption of ink to become slow in being small. As for especially the solvent absorbed amount of the ink absorption layer per unit area, it is still more desirable that they are two or more 10 ml/m<sup>2</sup> or more 5 ml/m<sup>2</sup>. When the solvent absorbed amount per unit area is small, and multicolor printing is performed, ink may especially overflow.

[0035] Moreover, in order for hydrated alumina to have sufficient ink rate of absorption, it is desirable that the average pore radius of hydrated alumina is 1-20nm, and it is especially desirable that it is 3-10nm. If a pore radius is too small, it will be hard coming to absorb ink. Moreover, if a pore radius is too large, fixation of the color in ink will worsen and a blot of an image will occur.

[0036] For hydrated alumina fully absorbing the color in ink, and being established, it is desirable that it is the range whose BET specific surface area is 70-300m<sup>2</sup>/g. if a BET specific surface area is too large -- the one where pore volume distribution is larger -- a piece -- the effectiveness of fixation of the color in ink worsens and a blot of an image occurs. Conversely, if a BET specific surface area is too small, distribution of hydrated alumina will become difficult.

[0037] In order to raise the concentration of the dispersion liquid of hydrated alumina, as for the number of the surface hydroxyl groups of hydrated alumina, it is desirable that they are 1020 or more pieces/g. If there are few surface hydroxyl groups, it will become difficult to become easy to condense hydrated alumina and to raise the concentration of dispersion liquid.

[0038] In this invention, coating of the hydrated alumina is usually carried out on a base material with a water-soluble binder. Moreover, it can use for the purpose of adjusting membrane formation nature, reinforcement, etc. of the acidity or alkalinity of coating liquid, coating liquid viscosity, and an ink absorption layer, combining a water-soluble binder two or more. As such a water-soluble binder, the polyvinyl alcohol of full saponification or partial saponification Although it is desirable especially in respect of adjustment of miscibility with hydrated alumina, and coating liquid viscosity etc. Methyl cellulose, methyl hydroxyethyl cellulose, methyl hydroxypropylcellulose, A cellulose type binder, starch, and its denaturation objects, such as hydroxyethyl cellulose, Gelatin and those denaturation objects, casein, a pullulan, gum arabic, Naturally-occurring-polymers resin or these derivatives, such as kadaya gum, albumin, and chitosan, The denaturation object of polyvinyl alcohol, such as cation denaturation and silanol denaturation, SBR RATEKKU, an NBR latex, a methyl methacrylate-butadiene copolymer, Although vinyl polymer, such as latexes, such as an ethylene-vinylacetate copolymer, polyacrylamide, and a polyvinyl pyrrolidone, polyethyleneimine, a polypropylene glycol, a polyethylene glycol, a maleic anhydride, or its copolymer can be mentioned This invention is not limited to these.

[0039] Moreover, when coating liquid is prepared, in order to acquire good acidity or alkalinity, it is desirable to choose a water-soluble binder so that the viscosity of the coating liquid to prepare may be set to 100cps or more. Moreover, since coating may become difficult when the viscosity of coating liquid is too high, as for the viscosity of coating liquid, it is desirable to choose a water-soluble binder so that it may be set to 5000cps or less.

[0040] Since too much amount of the water-soluble binder used in this invention may check absorption of ink when the reinforcement of an ink absorption layer will become weak if few, and reverse has it, 5 - 20 % of the weight has the desirable total amount of a water-soluble binder to hydrated alumina, and its 10 - 15 % of the weight is especially desirable.

[0041] In this invention, the lamination of an ink absorption layer may be a monolayer, or may be a laminating configuration.

[0042] In a laminating configuration, all layers may be layers containing hydrated alumina and a water-soluble binder, and you may be the laminating configuration of the layer and hydrated alumina which consist of other components, and the layer containing a water-soluble binder.

[0043] In the case of the layer containing hydrated alumina and a water-soluble binder, all layers may carry out the laminating of the same layer also as each class, and may carry out the laminating of the layer which has a different property. For example, in a bilayer configuration, the large layer of pore size can be prepared, the small layer of pore size can be prepared in a lower layer so that in favor of translucency, in order to gather ink rate of absorption to the upper layer, and it can make to balance ink rate of absorption and translucency etc. into the lamination doubled with the object.

[0044] Moreover, when making it the laminating configuration of the layer and hydrated alumina which consist of other components, and the layer containing a water-soluble binder, protective layers of ink permeability, such as colloidal silica, can be prepared in the upper layer of the layer which contains hydrated alumina and a water-soluble binder for the purpose of the improvement in for example, \*\*\*\*\*-proof, crack-proof nature,

etc. Moreover, it can make to prepare the ink absorption layer which turns into a lower layer of the layer which contains hydrated alumina and a water-soluble binder for the purpose of raising ink absorption capacity etc. from water soluble resin, such as polyvinyl alcohol and a polyvinyl pyrrolidone, etc. into the lamination doubled with the object.

[0045] As a raw material of hydrated alumina, they are JP,57-88074,A, 62-56321, JP,4-275917,A, 6-64918, 7-10535, a 7-267633 official report, a U.S. Pat. No. 2,656,321 description, and Am.Ceramic. The approach of hydrolyzing an aluminum alkoxide to Soc.Bull., 54,289 (1975), etc. is indicated. By this approach, hydrated alumina with dramatically high purity can be obtained.

[0046] It is common that the mineral salt of the \*\*\*\* aluminum illustrated by JP,54-116398,A, 55-23034, 55-27824, and the 56-120508 official report or its hydrate is used as a raw material of hydrated alumina on the other hand. As these mineral salt, the hydrate of these mineral salt, such as mineral salt, such as an aluminum chloride, an aluminium nitrate, an aluminum sulfate, a polyaluminum chloride, an ammonium alum, a sodium aluminate, potassium aluminate, and an aluminum hydroxide, etc. can be raised, for example.

[0047] The sodium ion contained in the mineral salt of aluminum, potassium ion, sulfate ion, etc. check raising the solid content concentration of dispersion liquid. So, when mineral salt or its hydrate is used as a raw material of hydrated alumina, it is necessary to remove these ion.

[0048] It is difficult to remove the ion (only henceforth inhibition ion) which prevents high concentration-ization of sodium ion, potassium ion, sulfate ion, etc. from hydrated alumina dispersion liquid, and it is effective to wash the gel hydrated alumina which made hydrated alumina gel. However, in washing by water, these inhibition ion cannot be removed, or the water of a large quantity is needed for removing in many cases, and inhibition ion can be more effectively removed by washing gel hydrated alumina using the water solution containing volatile-salts machine nature matter, such as ammonia.

[0049] A part of volatile-salts machine nature matter used for washing sticks to hydrated alumina, and even if it rinses, it is thoroughly unremovable. However, the volatile-salts machine nature matter can be effectively decreased by drying gel hydrated alumina and considering as xerogel. In addition, as an approach of obtaining xerogel, there is a method of drying hydrated alumina dispersion liquid by hot air drying, reduced pressure drying, freeze drying, spray drying, etc. In addition, the dispersion liquid of hydrated alumina can be obtained by making water re-distribute xerogel.

[0050] It is not limited especially as the manufacture approach of hydrated alumina. For example, hydrated alumina can be manufactured by neutralization reaction with acid aluminum salt water solutions, such as an aluminum sulfate, an aluminium nitrate, and an aluminum chloride, and basic water solutions, such as a sodium aluminate, a sodium hydroxide, and aqueous ammonia. In this case, it mixes in the range in which the amount of the hydrated alumina generated in liquid does not exceed 5 % of the weight, and, as for pH, it is common to make it react under 6-10, and conditions with a temperature of 20-100 degrees C. Moreover, \*\*\*\* pH indicated by JP,56-120508,A can be fluctuated by turns to an acid and base side, the approach of growing up the crystal of hydrated alumina, \*\*\*\* indicated by JP,4-33728,B, the hydrated alumina obtained from the mineral salt of aluminum, and the alumina obtained with a Bayer process can be mixed, and it can manufacture by the approach of rehydrating an alumina etc.



[0051] When manufacturing the recorded material for ink jets in this invention, as a base material used, polyester film, resin coat paper, coat paper, etc. are mainly used, for example, but it will not be limited especially if it is the base material which can prepare ink absorption layers, such as glass, aluminium foil, vacuum evaporation paper, a vacuum evaporation film, and a textile.

[0052] Moreover, although an ink absorption layer is prepared at least in one side of a base material, it is the object of preventing curl and may be prepared in both sides of a base material.

[0053] In order to obtain the recorded material for ink jets which has the feeling of gloss of the photographic paper tone of the photograph which is one of the technical problems of this invention, and aesthetic property, not only the presentation of an ink absorption layer but the property of a base material is important. In order to obtain the feeling of gloss of the photographic paper tone of a photograph, and aesthetic property, it is desirable to use polyester film or resin coat paper, and it is desirable that the brightness by Hunter measured by JIS-P -8123 of a base material is especially 65% or more.

[0054] Moreover, in order to have the feeling of gloss of the photographic paper tone of a photograph, and aesthetic property, it is desirable that the brightness by Hunter measured by JIS-P -8123 by the side of the ink absorption layer of the recorded material for ink jets is 65% or more, and it is desirable that the 60-degree specular gloss measured by JIS-Z -8741 is 30% or more.

[0055] Although it is not necessary to restrict to the thickness as a base material used for this invention especially in case polyester film is used, an about 10-200-micrometer thing is desirable from handling nature and the \*\*\*\* fitness of a printer.

[0056] In this invention, the polyester which is made to carry out the polycondensation of aromatic series dicarboxylic acid, such as a terephthalic acid, isophthalic acid, and naphthalene dicarboxylic acid, or the ester of those, and the polyhydric alcohol, such as ethylene glycol, a diethylene glycol, 1,4-butanediol, and neopentyl glycol, to polyester film, and is obtained is film-ized, and orientation processing is usually carried out by processing of a roll drawing, a tenter drawing, an inflation drawing, etc. in many cases.

[0057] Although what copolymerized other components is mentioned to polyethylene terephthalate, polyethylene butylene terephthalate, polyethylene -2, 6-naphthalate, and these as an example of polyester, this invention is not limited to these.

[0058] As an approach of raising the whiteness degree of polyester film, there are an approach of making non-subtlety particles, such as a barium sulfate, a titanium dioxide, a calcium carbonate, a silicon dioxide, an aluminum oxide, a kaolin, and talc, containing inside polyester film, the approach of carrying out coating of the white coating to a front face, etc.

[0059] Moreover, in order to give cushioning properties and concealment nature, the cavernous content film containing many cavities, for example, foaming polyester film etc., can be used for the interior of a film.

[0060] Although it is not necessary to restrict especially about thickness as a base material used for this invention also in case resin coat paper is used, a handling nature and the \*\*\*\* fitness of a printer to about 50-300 micrometers thing is desirable. Moreover, in order to obtain the aesthetic property of the photographic paper of a photograph, an about 200-300-micrometer thing is desirable.

[0061] Although the paper which especially a limit does not have a stencil for resin coat

papers, and is generally used can be used, a smooth stencil which is used for the base material for photographs is desirable preferably. as the pulp which constitutes a stencil -- natural pulp, playback pulp, a synthetic pulp, etc. -- one sort -- or two or more sorts are mixed and it is used. Additives, such as the sizing compound generally used of paper making, a paper reinforcing agent, a loading material, an antistatic agent, a fluorescent brightener, and a color, are blended with this stencil. Furthermore, surface coating of a surface sizing compound, a surface paper durability agent, a fluorescent brightener, an antistatic agent, a color, the anchoring agent, etc. may be carried out.

[0062] Moreover, the good thing of surface smooth nature of the stencil for resin coat papers carried out [ compress / during paper milling or after paper milling / a pressure / in a calender etc. / impress and ] is desirable, and especially the thing for 200 seconds or more has Beck's desirable smoothness measured by JIS-P -8119. Moreover, the basis weight has desirable 30 - 250 g/m<sup>2</sup>.

[0063] Although the whiteness degree of the stencil for resin coat papers has a high whiteness degree in the brightness by Hunter measured by JIS-P -8123 being 65% or more and a recorded material with a high-class feeling is obtained, the whiteness degrees for which it asks for the object differ, are un-\*(ed) as natural pulp, and may use together and use the blackish brown stencil using pulp. Moreover, the stencil colored using coloring agents, such as a color, may be used.

[0064] As coat resin for resin coat papers, polyolefin resin is desirable and especially polyethylene resin is desirable. Moreover, low density polyethylene, medium density polyethylene, high density polyethylene, or such mixture can be used. A consistency is the thing of 0.915 - 0.930 g/cm<sup>3</sup>, and the low density polyethylene said here is usually manufactured with a high pressure process. On the other hand, a consistency is a three or more 0.950 g/cm<sup>3</sup> thing, and high density polyethylene is usually manufactured by the low voltage method or the medium-voltage method. Independently, those two or more sorts can be mixed and what has various kinds of consistencies and melt flow rates can be used for these polyethylene resin.

[0065] The configurations of the resin layer of resin coat paper may be multilayer any more than a monolayer and a bilayer. Also in this case, independently, two or more sorts can be mixed and the above-mentioned polyolefin resin can be used. Moreover, it can also consider considering multilayer each class as a mutually different presentation as the same presentation. As an approach of forming the resin layer which consists of a multilayer, any of a coating method may be serially adopted with a co-extrusion coating method.

[0066] On the other hand, the resin layer of resin coat paper can be formed by coating a latex with film organization potency. For example, after coating the stencil for resin coat papers with a latex with the low minimum membrane formation temperature (MFT), it can be formed also by overheating to the temperature beyond the minimum membrane formation temperature.

[0067] As thickness of the coat resin layer of resin coat paper, although there is especially no limit, generally coating of it is carried out to the thickness of 5-50 micrometers to a front face or front flesh-side both sides.

[0068] In the resin of resin coat paper, white pigments, such as a titanium dioxide, a zinc oxide, talc, and a calcium carbonate, Fatty-acid amides, such as octadecanamide and an arachidic acid amide, zinc stearate, Fatty-acid metal salts, such as calcium stearate,

aluminum stearate, and magnesium stearate, Blue pigments and colors, such as an anti-oxidant, cobalt blue, ultramarine blue, sicilian blue, and a copper phthalocyanine blue, It can add combining suitably various kinds of additives, such as a pigment of Magentas, such as cobalt violet, fast violet, and manganese purple, a color, a fluorescent brightener, and an ultraviolet ray absorbent.

[0069] The resin coat paper used as a base material in this invention is manufactured by the so-called extrusion coating method which casts the polyolefin resin which carried out heating fusion on the stencil it runs. Moreover, in order to raise the adhesive property of resin and a stencil, before covering resin in a stencil, it is desirable to perform activation, such as corona discharge treatment and flame treatment, to a stencil. According to the application, as for the field (front face) where coating of the ink absorption layer of a base material is carried out, it has a glossy surface, a mat side, etc., and especially a glossy surface is used preferably. It is more desirable to carry out a resin coat from the point of curl prevention, although it is not necessary to necessarily cover resin at the rear face. A rear face is usually a mat side and can perform activity processing of corona discharge treatment, flame treatment, etc. also to front flesh-side both sides a front face or if needed.

[0070] Although this invention relates also to the recorded material for ink jets usable as an OHP film with high transparency, also in the recorded material of which the translucency of an OHP film etc. is required, not only the presentation of an ink absorption layer but the property of a base material is important for it. As for the light transmission nature at the time of using it as an OHP film, it is more desirable than total light transmission to people's sensation that the haze (haze value) according [ the direction of a haze (haze value) ] near and the ink absorption layer of this invention to JIS-K-7105 is especially 3.0 or less transparence base material.

[0071] Moreover, as for the haze of the recorded material for ink jets at the time of using it as an OHP film, in the recorded material for ink jets which prepared the ink absorption layer on the base material, it is desirable that the haze (haze value) by JIS-K-7105 of the recorded material for ink jets is especially 10.0 or less.

[0072] In addition, a haze (haze value) measures a luminous diffuse transmittance and total light transmission using an integrating-sphere type light transmission measuring device, and what the ratio expresses is set to JIS-K -7105.

[0073] In the recorded material of which the translucency of an OHP film etc. is required, although it is not necessary to restrict especially the thickness of the base material to be used, an about 50-200-micrometer thing is desirable from handling nature and the \*\*\*\* fitness of a printer.

[0074] When manufacturing the recorded material for ink jets in this invention, even if it does not add a surfactant, good coating nature can be obtained in many cases, but since coating nature is improved more, a surfactant can be added for the purpose of adjusting the diameter of a dot when ink adheres to an ink absorption layer. Although the surface active agent used has the desirable thing of the Nonion nature, it may be chosen from which type of an anion system, a cation system, the Nonion system, and a betaine system if needed, and a low-molecular thing or the low-molecular thing of a macromolecule is sufficient as it. You may use combining one sort or a two or more sort surfactant. The addition of a surfactant has desirable 0.001 - 5 weight section to the hydrated alumina 100 weight section which constitutes an ink absorption layer from an amount of solid

content, and is 0.01 - 3 weight section more preferably.

[0075] Furthermore, in an ink absorption layer, various well-known additives other than the above-mentioned surfactant, such as the fixing agent of an inorganic pigment, a coloring color, a color pigment, and an ink color, an ultraviolet ray absorbent, an anti-oxidant, the dispersant of a pigment, a defoaming agent, a leveling agent, antiseptics, a fluorescent brightener, a viscosity stabilizer, and a pH regulator, can also be added.

[0076] Moreover, if condensation etc. is not produced when it mixes with the dispersion liquid of hydrated alumina in order to raise the definition of an image, by containing the water repellent or the sizing compound of a fluororesin system, a silicone resin system, or an alkyl ketene dimer system in an ink absorption layer, the diameter of a printing dot can be controlled and the definition of an image can be raised. What is generally marketed can be used as the water repellent or the sizing compound of these fluororesin systems, a silicone resin system, or an alkyl ketene dimer system. Moreover, either these solutions or a drainage system emulsion is usable. The diameter of a printing dot is controllable with the addition of such water repellents to an ink absorption layer. Although the addition changes with each component, concentration, and diameters of a printing dot to wish, it is usually 0.1 - 5 % of the weight especially preferably 0.05 to 10% of the weight to the total solids of an ink absorption layer as an effective formed element.

[0077] As the coating approach of the ink absorption layer coating liquid in this invention, the coating approaches usually used, such as a slide hopper method, a curtain method, an extrusion method, an air knife method, a roll coating method, and a rod bar coating method, are used, for example.

[0078] A support layer may be prepared in the base material in this invention for the object of an ink absorption layer and a base material, such as adhesive improvement. A support layer can be made to add combining suitably solvent fusibility binders, such as hydrophilic binders, such as gelatin, and butyral, a latex, a curing agent, a pigment, a surfactant, etc.

[0079] Various kinds of back coat layers can be painted on the base material in this invention for antistatic nature, conveyance nature, curl tightness, note nature, sizing nature, etc. A back coat layer can be made to add combining suitably an inorganic antistatic agent, an organic antistatic agent, a hydrophilic binder, a latex, a curing agent, a pigment, lubricant, a surfactant, etc.

[0080]

[Example] Hereafter, although an example explains this invention in detail, the content of this invention is not limited to an example. In addition, that it is with the section means the weight section.

[0081] (Example of manufacture of the dispersion liquid of hydrated alumina) The example of manufacture of the hydrated alumina used for an ink absorption layer below is shown. All the used raw materials were commercial items, and further, purification was not carried out but was used as it was.

[0082] The example 1 of manufacture: The ion-exchange-water 800 section and the isopropyl alcohol 900 section were taught to the reactor of 3L, the aluminum isopropoxide 408 section was added, and it heated at 75 degrees C. The water 400 section was dropped over 6 hours, distilling off isopropyl alcohol. After distilling off of isopropyl alcohol was completed, temperature up was carried out to 95 degrees C, and it riped for 24 hours. Then, after adding the acetic-acid 24 section and agitating at 75 degrees C for

12 hours, it condensed so that the whole quantity might become the 800 sections, and the dispersion liquid A of white hydrated alumina were obtained.

[0083] When the X diffraction of the xerogel which dried this sol at the room temperature was measured, pseudo-boehmite structure was shown. Moreover, when mean particle diameter was measured with the transmission electron microscope, it was 10nm and the aspect ratio was 6. Moreover, when a BET specific surface area, an average pore radius, and pore volume were measured by the nitrogen adsorption desorption approach, they were 141m<sup>2</sup>/g, 8.7nm, and 0.76 ml/g, respectively.

[0084] The example 2 of manufacture: Commercial alumina sol (catalyst formation make, KATAROIDO AS- 3) was dried with the spray dryer (inlet temperature of 200 degrees C, outlet temperature of 80 degrees C), and xerogel was obtained. When the X diffraction of this xerogel was measured, pseudo-boehmite structure was shown. Moreover, it was 10nm when mean particle diameter was measured with the transmission electron microscope. Moreover, when a BET specific surface area, an average pore radius, and pore volume were measured by the nitrogen adsorption desorption approach, they were 261m<sup>2</sup>/g, 6.7nm, and 0.77 ml/g, respectively.

[0085] This xerogel 25 section was distributed in the ion-exchange-water 75 section, and white hydrated alumina dispersion liquid B were obtained.

[0086] (Example of preparation of coating liquid)

The example 1 of preparation: The 10% water-solution 15 of polyvinyl alcohol (the product made from the Shin-etsu chemistry, MA-26) section was added to the hydrated alumina dispersion-liquid A100 section obtained in the example 1 of manufacture, and the coating liquid A whose hydrated alumina content is 13% was prepared.

[0087] The example 2 of preparation: The 10% water-solution 25 of polyvinyl alcohol (the Kuraray make, PVA-635) section was added to the hydrated alumina dispersion-liquid B100 section obtained in the example 2 of manufacture, and the coating liquid B whose hydrated alumina content is 20% was prepared.

[0088] The example 3 of preparation: Ion exchange water was added, commercial alumina sol (the SATO RESEARCH make, A-365 aspect ratio nano whisker 4) was diluted, the 10% water-solution 25 of polyvinyl alcohol (the Kuraray make, PVA-635) section was added, and the coating liquid C whose hydrated alumina content is 20% was prepared.

[0089] (Production of the recorded material for ink jets) Although the example of production of the recorded material for ink jets concerning this invention is shown below, this invention is not limited to these.

[0090] Coating of the coating liquid A produced in the example 1 of example 1 preparation was carried out so that the amount of coating of coating liquid might become 200 g/m<sup>2</sup> to white polyester film (97 micrometers in made in ICI, MERINEKKUSU 339, thickness). It dried in the condition of not hitting a wind to a coating side side substantially using an infrared heater until the hydrated alumina content of the coating liquid by which coating was carried out on the base material exceeded 25 % of the weight. Next, blasting and the recorded material for ink jets were produced for 120-degree C hot blast on the coating side by 15 m/s. The crack was not accepted in the ink absorption layer of the obtained recorded material for ink jets.

[0091] Moreover, it was 88% when the specular gloss was measured 60 degrees according to the approach of JIS-Z -8741. In addition, in order to have the aesthetic

property of the photographic paper tone of a photograph, as for the 60-degree specular gloss, it is desirable that it is 70% or more.

[0092] Coating of the coating liquid B produced in the example 2 of example 2 preparation was carried out so that the amount of coating of coating liquid might become 200 g/m<sup>2</sup> to transparence polyester film (100 micrometers in made in ICI, MERINEKKUSU 705, thickness). 120-degree C hot blast was guessed from the tooth back of a base material, and condition \*\*\*\*\* of the wind was substantially hit, twisted and carried out at the coating side side until the hydrated alumina content of the coating liquid by which coating was carried out on the base material exceeded 25 % of the weight. Next, blasting and the recorded material for ink jets were produced for 120-degree C hot blast on the coating side by 15 m/s. The crack was not accepted in the ink absorption layer of the obtained recorded material for ink jets.

[0093] Moreover, it was 6.2 when the haze (haze value) was measured according to the approach of JIS-K -7105. In order to use it as an OHP film, as for a haze (haze value), it is desirable that it is especially 10.0 or less.

[0094] Coating of the coating liquid B produced in the example 2 of example 3 preparation was carried out so that the amount of coating of coating liquid might become 200 g/m<sup>2</sup> to transparence polyester film (100 micrometers in made in ICI, MERINEKKUSU 705, thickness). It dried in the condition of pushing 120-degree-C hot calender roll against the tooth back of a base material, and not hitting a wind to a coating side side substantially until the hydrated alumina content of the coating liquid by which coating was carried out on the base material exceeded 25 % of the weight. Next, blasting and the recorded material for ink jets were produced for 120-degree C hot blast on the coating side by 15 m/s. The crack was not accepted in the ink absorption layer of the obtained recorded material for ink jets. Moreover, it was 6.0 when the haze (haze value) was measured according to the approach of JIS-K -7105.

[0095] Coating of the coating liquid B produced in the example 2 of example 4 preparation was carried out so that the amount of coating of coating liquid might become 200 g/m<sup>2</sup> to transparence polyester film (100 micrometers in made in ICI, MERINEKKUSU 705, thickness). It dried in the condition of not hitting a wind to a coating side side substantially until the hydrated alumina content of the coating liquid by which coating was carried out on the base material exceeded 25 % of the weight, having maintained 120-degree C hot blast at blasting, and maintaining the inside of an oven at the wall surface of an oven at 120 degrees C. Next, blasting and the recorded material for ink jets were produced for 120-degree C hot blast on the coating side by 15 m/s. The crack was not accepted in the ink absorption layer of the obtained recorded material for ink jets. Moreover, it was 6.0 when the haze (haze value) was measured according to the approach of JIS-K -7105.

[0096] Coating of the coating liquid C produced in the example 3 of example 5 preparation was carried out so that the amount of coating of coating liquid might become 200 g/m<sup>2</sup> to white polyester film (97 micrometers in made in ICI, MERINEKKUSU 339, thickness). It dried in the condition of not hitting a wind to a coating side side substantially using an infrared heater until the hydrated alumina content of the coating liquid by which coating was carried out on the base material exceeded 25 % of the weight. Next, blasting and the recorded material for ink jets were produced for 120-degree C hot blast on the coating side by 15 m/s. The crack was not accepted in the ink



absorption layer of the obtained recorded material for ink jets. Moreover, it was 92% when the specular gloss was measured 60 degrees according to the approach of JIS-Z - 8741.

[0097] Coating of the coating liquid B produced in the example 2 of example of comparison 1 preparation was carried out so that the amount of coating of coating liquid might become 200 g/m<sup>2</sup> to transparence polyester film (100 micrometers in made in ICI, MERINEKKUSU 705, thickness). Next, blasting and the recorded material for ink jets were produced for 120-degree C hot blast to the coating side side by 15 m/s. In the ink absorption layer of the obtained recorded material for ink jets, the crack occurred mostly on the whole surface. Moreover, it was 26.4 when the haze (haze value) was measured according to the approach of JIS-K -7105.

[0098] Coating of the coating liquid B produced in the example 2 of example of comparison 2 preparation was carried out so that the amount of coating of coating liquid might become 200 g/m<sup>2</sup> to white polyester film (97 micrometers in made in ICI, MERINEKKUSU 339, thickness). Next, blasting and the recorded material for ink jets were produced for 120-degree C hot blast to the coating side side by 15 m/s. In the ink absorption layer of the obtained recorded material for ink jets, the crack occurred mostly on the whole surface. Moreover, when the specular gloss was measured 60 degrees according to the approach of JIS-Z -8741, it was 58% again.

[0099] (Printing assessment) the recorded material for ink jets obtained in the examples 1-5 -- the product made from canon -- full color -- it printed using ink jet printer BJC-610J. Consequently, there was no nonuniformity etc. in the printed part and any recorded material for ink jets was good image quality.

[0100]

[Effect of the Invention] In the manufacture approach of the recorded material for ink jets of having prepared the ink absorption layer containing hydrated alumina on the base material, the manufacture approach of the recorded material for ink jets which controlled the crack of the ink absorption layer at the time of desiccation was able to be offered so that clearly from an example.